Centenary College
of
Louisiana

Student Research Forum

Friday, April 24, 1998
Kilpatrick Auditorium

CENTENARY COLLEGE
STUDENT RESEARCH FORUM

Sponsored by The Muses and Provost & Dean of the College

	1:00	Opening
Humanities Division		
	1:15	Jennifer Phifer
Social Sciences Division		
	1:30	Amanda Ellis
	1:45	Amy Burford, Molly Love
	2:00	Jamie McDowell
	2:15	Allyson Eddy
	2:30	Tonya Jordan
	2:45 - 3:15	**BREAK**
Natural Sciences/Mathematics		
	3:15	Valerie Curtis
	3:30	Nicole Smith
		Netsanet Temesgen
	3:45	Brock Stephens
	4:00	Jeff Wojtkiewiez
	4:15	Monique Cousins
	4:30	Matthew Morgan
	4:45	Treva Armstrong
	5:00	Mike Marsh
POSTERS		
		April Calaway
		Christina Ledbetter

Director
Dr. Yvonne Ilke Yaz

Judges
Dr. Ken Aizawa
Dr. Joyce Johnson
Dr. Jerry Lisantti

RESEARCH PAPERS

T. S. Eliot, Quartet No. 2 in A minor, Op. 132

***JENNIFER PHIFER**
Department of English, Humanities Division

T.S. Eliot exploited a conversational rhythm that inhabits poetry and is inseparable from the words that form the poem. Rhythm is the thrust of a poem's musical effect, controlling tone, tempo, and style. Eliot thus proposed a poetic venture: create a word quartet that goes "beyond poetry" just as Ludwig van Beethoven's later quartets went "beyond music." Eliot's particular influence from Beethoven's Quartet No. 15 in A minor, Op. 132, is seen superficially in the structure (Beethoven's fifteenth quartet has five movements; each of Eliot's quartets have five sections) and further in theme and tone. Therefore, Eliot's meditation on Christianity can be analyzed according to music theory, specifically granting Beethoven's tempo and style markings to each of Eliot's sections. In Four Quartets, Eliot created a poetic work governed by music theory in structure and subject. "East Coker" in particular demonstrates this, for its reflective and penitential words reveal structural relationships to tonal harmonic theory, especially to the composition, form, and theme of Beethoven's fifteenth string quartet.

MEDICARE MANAGED CARE: PAST, PRESENT AND FUTURE

By Amanda C. Ellis*, Frank M. Stevenson, and Barbara J. Davis
Social Sciences Division

Medicare has provided federal health insurance for people aged 65 or older and for certain disabled individuals since 1966, primarily under a fee-for-service approach. With the passage of the Tax Equity and Fiscal Responsibility Act (TEFRA) in 1982, Congress allowed Medicare beneficiaries to join a managed care plan, also referred to as a health maintenance organization (HMO). Medicare managed care has recently experienced an unprecedented growth; as of August 1997, more than 5.5 million Medicare beneficiaries were enrolled in managed care plans, accounting for 14% of the total Medicare population and representing a 132% increase in managed care enrollment since 1992. Why has Medicare managed care suddenly moved forward and in what direction is it headed?

Determining why Medicare beneficiaries are rushing to sign up for Medicare managed care plans requires researching the background of such plans: why, when, and where did the first Medicare managed care plan arise. This paper examines in detail six Medicare managed care plan markets, three mature and three emerging ones. HMO executives, Health Care Financing Administration (HCFA) Regional Office Managers, and enrollees were interviewed to get current data of the six Medicare managed care markets as well as current economic trends. Collectively, the Medicare managed care market trends of the past and the present market and economic situation lead to a sound conclusion on the direction of Medicare managed care in the next century.

The Effect of Ownership on Executive Compensation in the Real Estate Industry

AMY BURFORD*, MOLLY LOVE*
DR. BARBARA DAVIS and DR. HELEN MASON
Frost School of Business, Social Sciences Division

The purpose of this study is to examine the relationships between executive compensation and institutional ownership in the real estate industry. The changing of real estate ownership from individual to institutional has brought about the importance of this study. The sample includes observations of publicly-held real estate firms for a seven year period, 1988-1994. Multiple regression analysis identifies significant relationships.

Institutional owners and insiders should play an important role in the determination of executive compensation which should be consistent with the literature. The research hypothesizes a positive relationship between executive compensation and institutional owners. A negative relationship is expected between insiders and executive compensation. Institutions should be willing to pay executives more to get the results they expect. Insiders who are also executives may be willing to take less pay due to the vested interest in their company.

The Importance of Internships in Relation to Satisfaction with the College and Post College Experience

*Jamie McDowell
Department of Sociology, Social Science Division

The importance that internships have played in a student's retrospective satisfaction of their college experience has been researched by using a new content analysis program. By using past and current student interviews, this program makes it possible to quantify the qualitative data given by the students. This research will prove the importance of the change in the departmental requirements (internship requirements), and how these requirements have and will assist students when making career decisions.

Occurrence of Sex Crimes on Centenary Campus as Reported by Students

*Allyson Eddy, Rebecca Harper, Natisha Harrell
Department of Sociology, Social Sciences Division

The student handbook (1997-1998) reports few or no sex crimes at Centenary between 1991 and 1996. Research shows that such crimes often go unreported. A survey was conducted to determine if sex crimes 1) have occurred; 2) were reported; and 3) were pursued by on or off-campus authorities.

The Middle Class and Artisans During the German Revolution of 1848

Tonya M. Jordan and Dr. Alton Hancock
History Department, Social Sciences Division

This presentation will look at the social and political conditions of the German middle class and artisans prior to and during the March revolution of 1848; specific pieces of art and literature will be used in this presentation.

An Investigation of Parameters of Nucleophilic Substitution

***Valerie Curtis, Dr. Ernest Blakeney**
Department of Chemistry, Natural Sciences Division

Reaction parameters for the reaction of sodium methoxide with a series of alkyl halides were investigated by following reaction kinetics. For each alkyl halide studied, reactions were assembled that contained 1) 1.OM alkyl halide and 0.5M methoxide, 2) 0.5M alkyl halide and 0.5M methoxide, and 3) 0.5M alkyl halide and 1.OM methoxide and all reactions contained 0.5M toluene as an initial standard. Kinetics were followed by periodically injecting 0.0025mL samples on an isothermal gas chromatograph and monitoring the disappearance of the alkyl halide peak.

Analysis of the data collected allowed segregation of the halides into groups demonstrating first and second order kinetics, and an absolute determination of the rate constants. These findings can be correlated with structural features in the alkyl halides.

A MODIFIED WITTIG REACTION SUITABLE FOR UNDERGRADUATE TEACHING LABORATORIES

Nicole Smith*and Netsanet Temesgent* and Ernest Blakeney
Department of Chemistry, Natural Sciences Division

The Wittig reaction is a powerful tool for alkene synthesis, but its requirement for highly basic, potentially hazardous reagents and the necessity of elaborate precautions to exclude water have minimized its inclusion in the introductory organic laboratory. We have developed a modification of the method that uses more manageable, moisture tolerant conditions. In our modification, the reaction is carried out in dimethyl sulfoxide-potassium t-butoxide solution in a reaction vessel fitted with only a calcium chloride drying tube to exclude moisture. Product is isolated through pentane extraction from a 50% water dilution of the reaction mixture. Data from a number of reactions using a variety of carbonyl compounds and Wittig reagents will be presented.

OPTICAL AND MICROSCOPY INVESTIGATIONS OF SOOT STRUCTURE ALTERATIONS BY LASER-INDUCED INCANDESCENCE

*A. Brock Stephens, T.M. Ticich, and R.L. Vander Wal, Nyma@NASA-Lewis Research Center.
Department of Chemistry, Natural Sciences Division

Understanding the physical process of laser-induced incadescence (LII) is central to practical implementation and accurate theoretical modeling. TEM investigations of morphological changes in the soot show increasing graphitization with increasing laser fluence. For laser fluences above 0.45 + /-0.5 J/cm^2 at 1 064 nm, vaporization and fragmentation of soot primary particles and aggregates occurs. Optical measurements are performed using a second laser pulse to probe the effects of these changes upon the LII signal. With the exception of very low fluences, the structural changes induced in the soot lead to a decreased LII intensity produced by the second laser pulse. These two-pulse experiments also show that these changes do not alter the LII signal on time scales less than 1 microsecond for fluences below the vaporization threshold.

A New Approach Approximation in Quantum Mechanics

*Jeff Wojtkiewicz and Joel Cannon
Physics Department, Natural Sciences Division

We present a new approximation method for determining the energies and wave functions of one dimensional quantum systems that is mathematically related to the Raleigh Ritz variational method, but which is superior because it eliminates several of Raleigh Ritz's shortcomings. In particular, our method does not require an initial trial wave function, yields excited states and produces results to any desired accuracy.

We use simple harmonic oscillator states as a basis for computing the eigenvalues of any quantum system. Mathematically this is equivalent to using, $\Psi = C_0|\psi_0\rangle + C_1|\psi_1\rangle + \ldots + C_n|\psi_n\rangle$, where the coefficients are the variational parameters. Within this basis we construct and diagonalize a Hamiltonian matrix to obtain the system's eigenvalues and eigenfunctions. By increasing the basis size we can use this method to obtain eigenvalues and eigenfunctions to arbitrary precision.

To determine this method's practicality, we calculated the ground states for the known potential, x^4. For modest size basis, ($9 \leq n \leq 20$), the ground state energy is within 1% of the actual value for $1 \leq w \leq 10$. Since basis sizes of up to 100 can be handled easily by computers this method should reliably calculate the eigenvalues for most systems.

The Julia Set

*Monique Cousins and Dr. Yvonne Yaz
Department of Mathematics, Natural Sciences Division

This paper gives a brief background of dynamical systems in introducing the Julia set. A program was written in Matlab to graph the set in a simplistic form. In short, the Julia set is the set of boundary points between escaping and non-escaping points for the complex quadratic family $Q_C = z^2 + c$.

Perceived Physical Fitness in Comparison to Actual Physical Fitness in College Students

*Matthew Morgan
Department of Applied Science, Natural Sciences Division

The purpose of this study was to identify differences in students' perceptions of their physical fitness and their actual physical fitness. The subject population consisted of 109 college students enrolled in the Dynamics of Physical Fitness course at Centenary College. All subjects completed a Physical Fitness Inventory questionnaire that I designed. Subjects were then monitored through the Dynamics of Physical Fitness class for their actual levels of fitness. These levels of fitness were determined by physical fitness tests administered according to the Dynamics of physical Fitness class schedule and protocol as determined by the professors in the Department of Health and Exercise Science. The physical fitness tests included the push-up/dip muscular endurance test, the sit and reach flexibility test, the 1.5 mile run/walk cardiovascular fitness test, and the body composition test. Comparisons were then made between perceived physical fitness and actual physical fitness. Comparisons were also made between subgroups within the population which included class, major, varsity athlete, and sex. Further research could prove useful in determining the most effective ways to educate students to properly perceive their levels of physical fitness.

Do Different Recreational Sports Have an Effect on the Quadriceps Femoris and Brachioradialis Muscles in Female Athletes?

*Treva L. Armstrong
Department of Biology, Natural Sciences Division

Electromyography (EMG) is the study of nerve actions used to determine whether a muscle is in a state of rest or contraction. In this presentation, electrical activities of the brachioradialis (BR), a major forearm muscle and the quadriceps femoris (QF), a major upper leg muscle, were recorded in four athletic groups: golf, volleyball, soccer, and gymnastics. The average change in voltage during contractions was measured in both the QF and BR muscles. I predicted that there would be no difference in there relative EMG measurements among the individual sports categories. An analysis, was performed on the EMG readings (in relative units). Individuals who played soccer experienced the

greatest relative voltage change (200.558 ± 21.342) in the BR muscle, followed by gymnastics (187.985 ± 16.122), volleyball (142.850 ± 18.695) and golf (113.460 ± 12.297), respectively. A one-way ANOVA showed that there was a significant difference among the groups. Gymnasts experienced the greatest relative voltage change (194.6275 ± 83451) in the QF muscle, followed by soccer players (183.008: ± 19.9368), volleyball players (156338 ± 14.089) and golf players (103.993 ± 11.521). Again, a one-way ANOVA showed that there was a significant difference between the groups. The exercise regimes used for training in the different sports may explain the differences in relative EMG activity.

Designing a Molecular Light Switch

Mike Marsh* and Eric First
Dept of Biochemistry, LSU Medical Center, Natural Sciences Division

All higher-order cells orchestrate cellular division among a population of cells through a sophisticated intercellular signaling cascade. Cells communicate with each other by sending chemical signals that can be interpreted by the recipient cell. When a signal to "divide" is kept on--or inversely, when a signal to "stop dividing" is blocked--the recipient cell and all its progeny continue to divide prolifically. This uncontrollable cell growth is the basis of all forms of cancer.

Limitations in biochemical techniques make it impossible to determine what signals are active in a living cell at any instant in time. In an effort to overcome this limitation and abet cellular cancer research, we have begun to engineer fluorescent proteins to act as biosensors that will indicate what signals are active in living cells. By making alterations to a naturally fluorescent protein, we hope to make its fluorescence contingent on what chemical signals are active at any given time. Therefore, simply checking to see if the cell under study is fluorescent would indicate what signals were currently active.

POSTERS

Optimization of Reverse Transcription-Polymerase Chain Reaction Protocols for Mouse Inducible Nitric Oxide Synthase and Glyceraldehyde-3-Phosphate Dehydrogenase

*April D. Callaway, André N. Blanchard, Loren P. Walsh, and Matthew B. Grisham
Department of Biology, Natural Sciences Division
Department of Molecular and Cellular Physiology, LSUMC-Shreveport

The purpose of this project was to optimize reverse transcription-polymerase chain reaction (RT-PCR) protocols for mouse inducible nitric oxide synthase (INOS) and glyceraldehyde-3-phosphate dehydrogenase (GAPDH). Initial RT-PCR reactions were conducted with conditions obtained from the literature and the PCR products were fractionated on agarose gels. Reaction parameters were altered in order to eliminate

nonspecific PCR product and to minimize the amount of time and reagents necessary to complete the reactions, without compromising the integrity and intensity of the desired product band. The data led to conclusions about the optimal primer dilution for each of the genes. Reaction results also indicated that INOS PCR required far less extension time per cycle and less complete cycles than specified in the original protocols from the literature. As a result of these conclusions, INOS PCR can now be conducted successfully 'in half the amount of time originally required, with much more specific results. Optimization of the GAPDH RT-PCR protocols allows for the gene's use as a housekeeping gene.

A Desktop PET Scanner: An Educational Tool For Students

***Christina Ledbetter and John Sunderland.**
Department of Physics, Natural Sciences Division

An inexpensive, small scale, fully functional dual-detector positron emission tomography system has been built and pressed into educational duty. 'Me system uses two stationary, collimated 2x2 NaI scintillation detectors (variable collimator size) set 30 cm apart. The amplified signals from the detectors are routed through NIM single channel analyzers and a variable window coincidence unit set to 100 nsec. The TTL coincidence output is sent to an EG&G multichannel scaling card (MCS-Plus) installed in a 166Mhz Pentium PC. The phantom to be imaged is secured on a custom machined two piece aluminum gantry with rotational and translational degrees of freedom. Image reconstruction is performed using standard filtered backprojection algorithms using code generated in a PV-Wave (Visual Numerics) programming environment. All reconstruction steps are dynamically displayed on the computer monitor, including sinogram creation, stepwise creation of the backprojected image, Fourier transform steps, filtering, and final image formation. Measured sensitivities and resolution of the device are primarily a function of detector collimation and angular and linear sampling distances. Present resolution is limited by the rigid sampling spacing defined by the gantry baseplates. Preliminary measurements with a line source demonstrate a reconstructed resolution of 9mrn FWHM and 18 mm FWTM. Planned improvements include implementation of a computer controlled gantry with variable angular and linear movements.